We Claim:

1. A method for detecting a physiological property of target myocardial tissue, comprising: noninvasively inducing a tissue displacement at a target myocardial tissue site by applying an ultrasound pulse; noninvasively acquiring data relating to an acoustic property of the target myocardial tissue site prior to and/or during and/or following the induction of tissue displacement; and relating the acquired data with a physiological property of the myocardial target tissue or a cardiac parameter.

2. A method of claim 1, wherein the data acquired relating to an acoustic property of the target myocardial tissue site is acquired by administering a plurality of acoustic interrogation pulses to the target tissue site and collecting acoustic data from the target tissue site.

3. A method of claim 1, wherein the data relates to at least one of the magnitude, amplitude and phase of acoustic scatter.

4. A method of claim 1, additionally comprising collecting acoustic data from the target myocardial tissue site using an ultrasound transducer operating in at least one of the following modes: transmission mode, reflection mode, scatter mode, backscatter mode, emission mode, echo mode, Doppler mode, color Doppler mode, harmonic or subharmonic imaging modes, a-mode, b-mode or m-mode; and correlating the acoustic data relating to the induced tissue displacement with a physiological property of the target tissue.

5. A method of claim 1, wherein the target myocardial tissue site includes or is in proximity to a blood vessel and a physiological property detected is arterial blood pressure.

6. A method of claim 1, additionally comprising comparing the with an empirically determined standard.

7. A method of claim 1, additionally comprising acquiring multiple data sets, each data set relating to different points in time relative to the application of the acoustic radiation force.

8. A method of claim 1, additionally comprising inducing tissue displacement at a second target tissue site different from the first by applying a second ultrasound pulse, acquiring data relating to an acoustic property of the second target tissue site.

9. A method of claim 8, additionally comprising comparing the acquired data relating to the tissue displaced at the target myocardial tissue site with the acquired data relating to an acoustic property of the second target tissue site.

10. A method of claim 1, additionally comprising applying a plurality of different ultrasound pulses to the target myocardial tissue site and acquiring data relating to acoustic properties induced by the different ultrasound pulses.

11. A method of claim 1, additionally comprising applying a plurality of ultrasound pulses to a plurality of target tissue sites and acquiring data relating to the induced tissue displacements at the plurality of target tissue sites.

12. A method of claim 1, comprising: applying focused ultrasound and inducing oscillation of the target myocardial tissue; measuring the frequency of an acoustic signal emitted from the target myocardial tissue; and relating the frequency of the emitted acoustic signal to a physiological tissue property.

13. A method for assessing a physiological property of a target myocardial tissue, comprising the steps of: acquiring acoustic data relating to intrinsic tissue displacements at a target myocardial tissue site at multiple time points over the course of at least one cardiac cycle, and relating the acoustic data with a physiological property of the target myocardial tissue, wherein said acoustic data is collected by using an ultrasound transducer.

14. The method of claim 13, wherein said ultrasound transducer operates in at least one of the following modes: transmission mode, reflection mode, scatter mode, backscatter mode, emission mode, echo mode, Doppler mode, color Doppler mode, harmonic or subharmonic imaging modes, a-mode, b-mode or m-mode; and correlating the acquired acoustic data relating to intrinsic tissue displacement with a physiological property of the target tissue.

15. The method of claim 13, further comprising the step of acquiring acoustic data relating to intrinsic tissue displacements at multiple target tissue sites at multiple time points over the course of at least one cardiac cycle.

16. The method of claim 13, wherein the acoustic data acquired relating to the intrinsic tissue displacement at the target myocardial tissue site relates to acoustic properties of the target myocardial tissue.

17. The method of claim 13, wherein said acoustic properties of the target myocardial tissue are selected from the group consisting of changes in the amplitude of acoustic signals, changes in phase of acoustic signals, changes in frequency of acoustic signals, changes in acoustic emission signals, changes in length of scattered signals relative to an interrogation signal, changes in maximum and/or minimum amplitude of an acoustic signal within a cardiac cycle, the ratio of the maximum and/or minimum amplitude to that of the mean or variance of subsequent oscillations within a cardiac cycle, changes in temporal or spatial variance of scattered signals at different times in the same location and/or at the same time in different locations, and rates of change of tissue displacement or relaxation.

18. The method of claim 13, wherein said acoustic data relating to said intrinsic tissue displacement at the target myocardial tissue site is acquired by administering acoustic interrogation pulses to the target myocardial tissue site and collecting acoustic scatter data.

19. The method of claim 13, further comprising the step of relating the intrinsic tissue displacement data and additional data relating to blood pressure, cardiac and/or respiratory cycles, to a physiological property of said target myocardial tissue.

20. The method of claim 13, wherein said acoustic data is collected using an ultrasound transducer array.